MILAGRO

Megacity Initiative - Local and Global Research Observations

MIRAGE-Mex

MAX-Mex

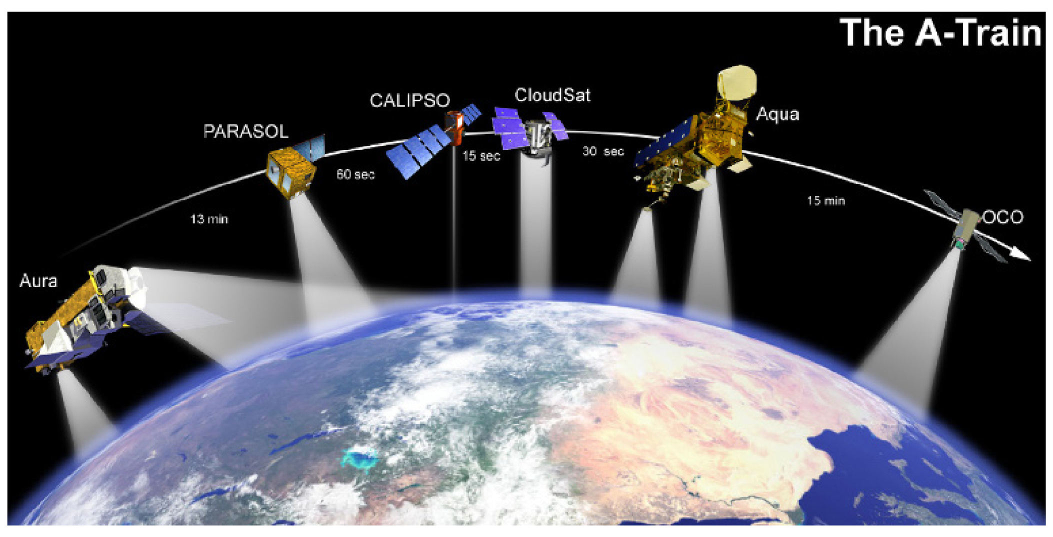
MCMA

INTEX-B

MARCH 1-31
2 0 0 6

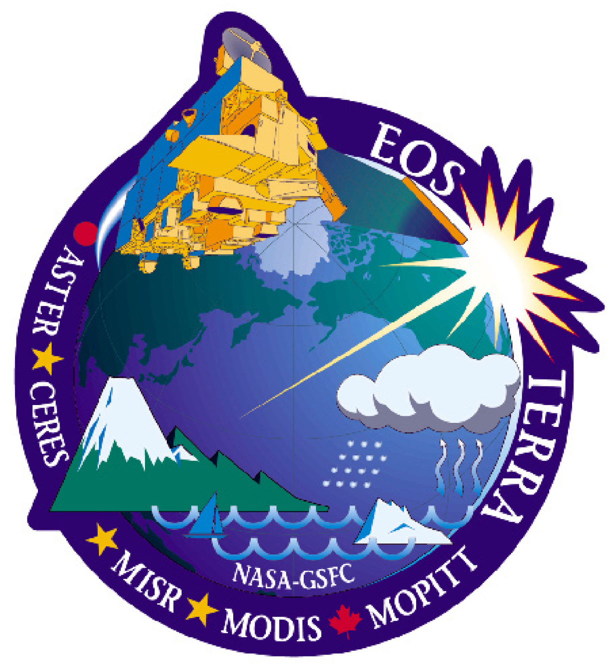
SATELLITE OBSERVATIONS

Three A-Train satellites will provide information during the MILAGRO Campaign



The National Aeronautics and Space Administration (NASA) uses a set of satellites that fly in sequence over a common ground track to study the atmosphere. These satellites are known as "A-Train". Many DC-8 and J31 flights will include legs or profiles under the A-Train or other satellites.

TERRA

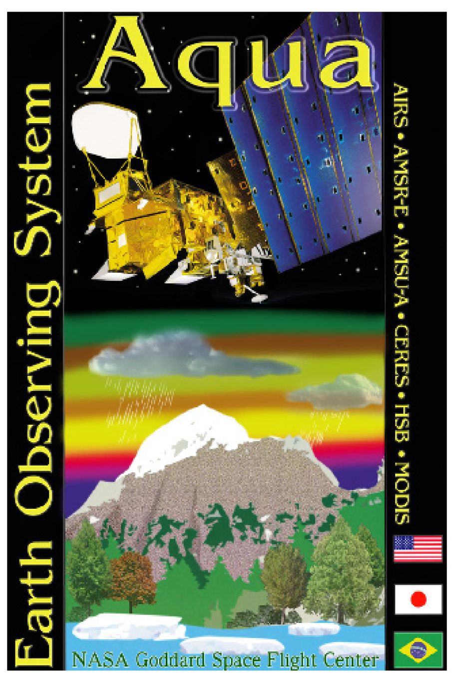


MOPITT: Measurements of Pollution In The Troposphere
+Measurements of CO

MODIS: MODerate resolution Imaging Spectroradiometer
+Measurements of aerosol optical depth

MISR: Multi-angle Imaging Spectro-Radiometer
+ Measurements of aerosol amount, type, and vertical distribution

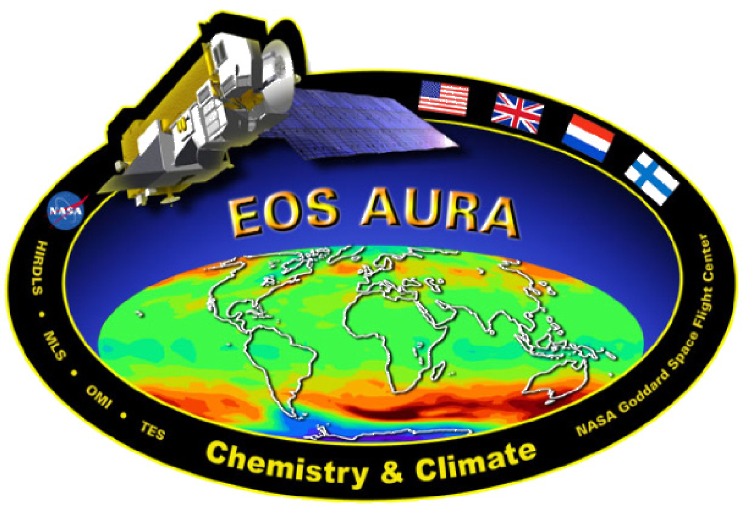
AQUA



AIRS: Atmospheric InfraRed Sounder
+Measurements of CO

MODIS: MODerate resolution Imaging Spectroradiometer
+Measurements of aerosol optical depth

AURA



TES: Tropospheric Emission Spectrometer
+Measurements of O3, CO, and HNO3

OMI: Ozone Monitoring Instrument
+ Measurements of O3, NO2, HCHO, SO2, and aerosol properties

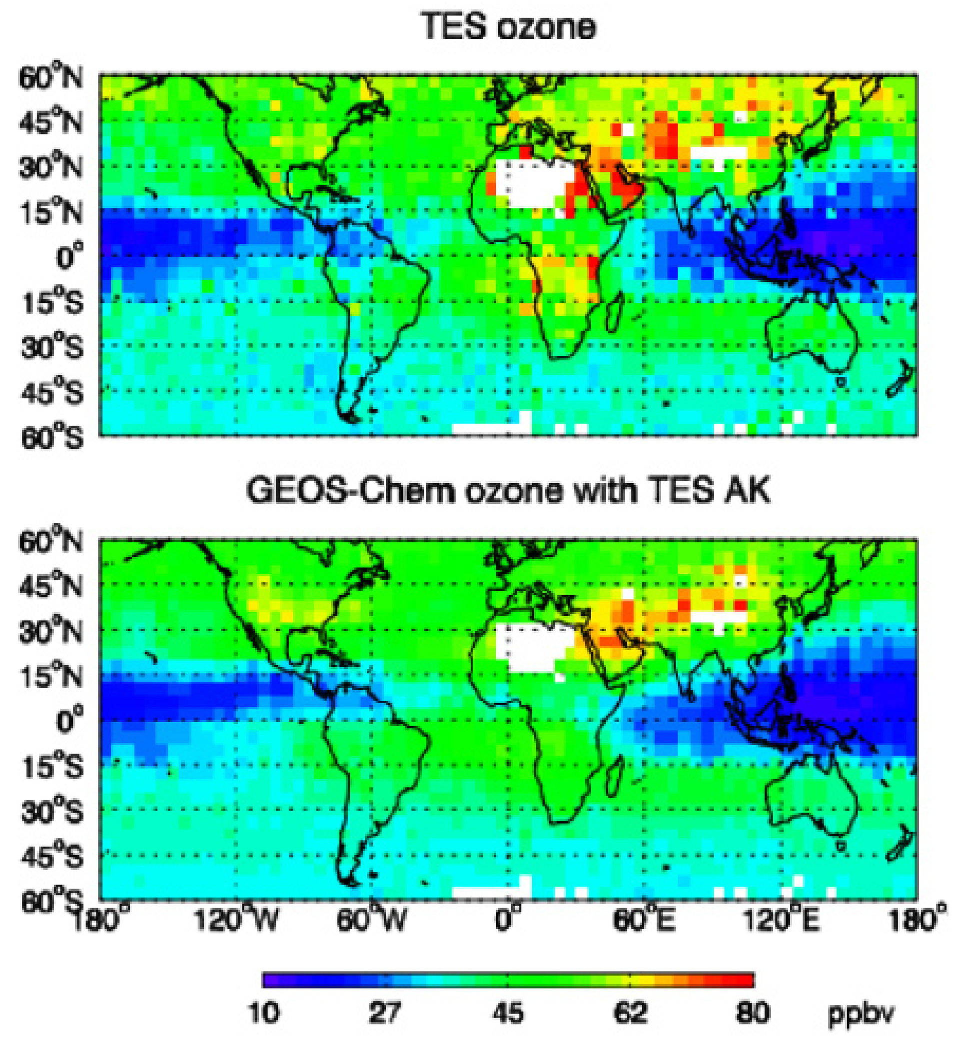


Image provided courtesy of Daniel Jacob; Harvard University and Greg Osterman; Jet Propulsion Laboratory

Ozono (O_3) -TES

Ozone is a pollutant requiring regulation due to its toxicity to humans, animals, and plants. Since it is a chemical byproduct that is generated over time, pollution impact related to ozone is often greater downwind of pollution sources. Shown below is the mean concentration of ozone at 618 hPa observed by TES for 4-31 July 2005, and corresponding GEOS-Chem model values sampled along the TES orbit tracks and with TES averaging kernels applied. The data are averaged over a 4×5 degree grid. Each grid cell includes typically 5-15 data points. (White areas have no data meeting the retrieval quality criteria.)

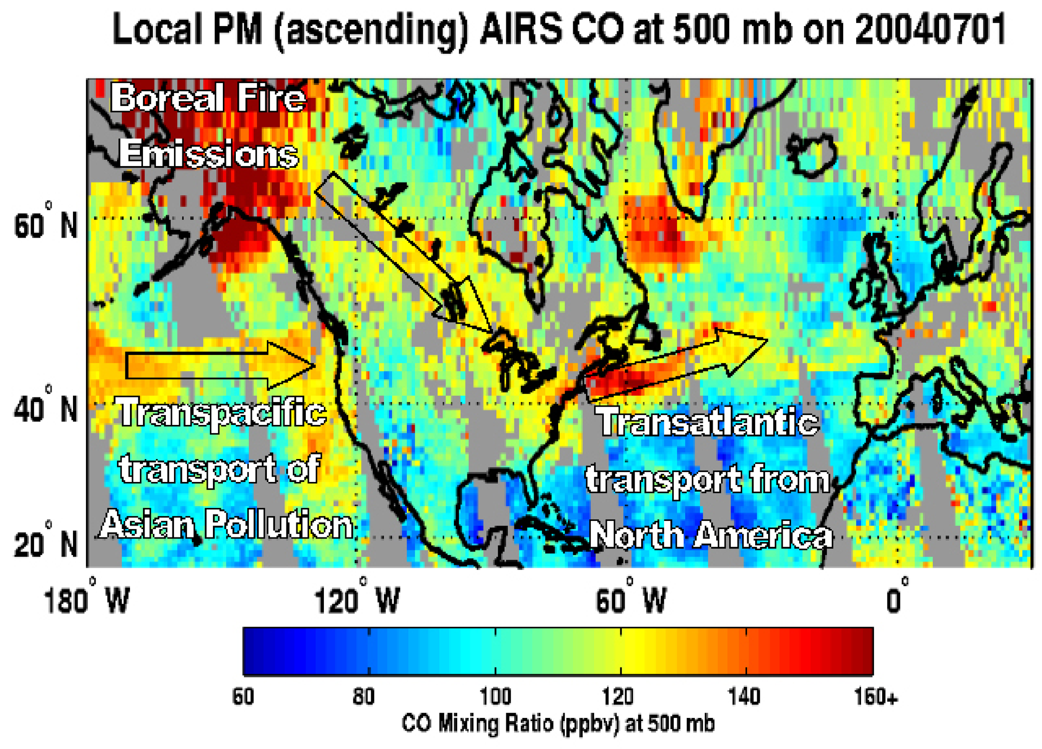
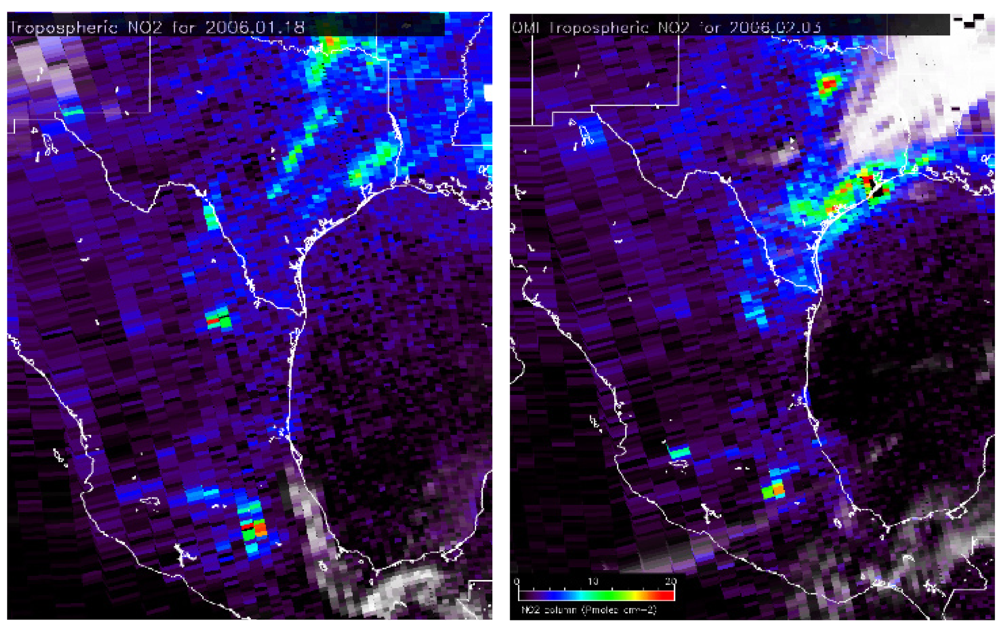


Image provided courtesy of Wallace McMillan; University of Maryland, Baltimore County

Carbon Monoxide (CO) - AIRS

The distribution of carbon monoxide in the atmosphere is largely controlled by combustion processes due both to natural and human causes: fossil fuel burning, forest fires, land clearing, etc. Its lifetime in the atmosphere (about 1 month) enables it to transport over long distances, making CO useful for tracking pollution sources and the assessing their global impact. In the figure below, AIRS observations of CO demonstrate major sources and transport patterns over North America. (Gray areas indicate regions that were not observed due to cloudiness or to the satellite's trajectory.)



Images provided courtesy of James Gleason; NASA Goddard Space Flight Center

Nitrogen Dioxide (NO2) - OMI

Nitrogen Dioxide is one of the prime ingredients in the chemistry of ozone production and the generation of photochemical smog. The lifetime of NO2 is very short, and it is typically not transported far from sources. Thus, its distribution emphasizes pollution source regions. In the figure below, OMI observations of NO2 show large metropolitan areas (e.g., Houston and Dallas, Texas and Mexico City) to be dominant sources of this important ozone precursor.

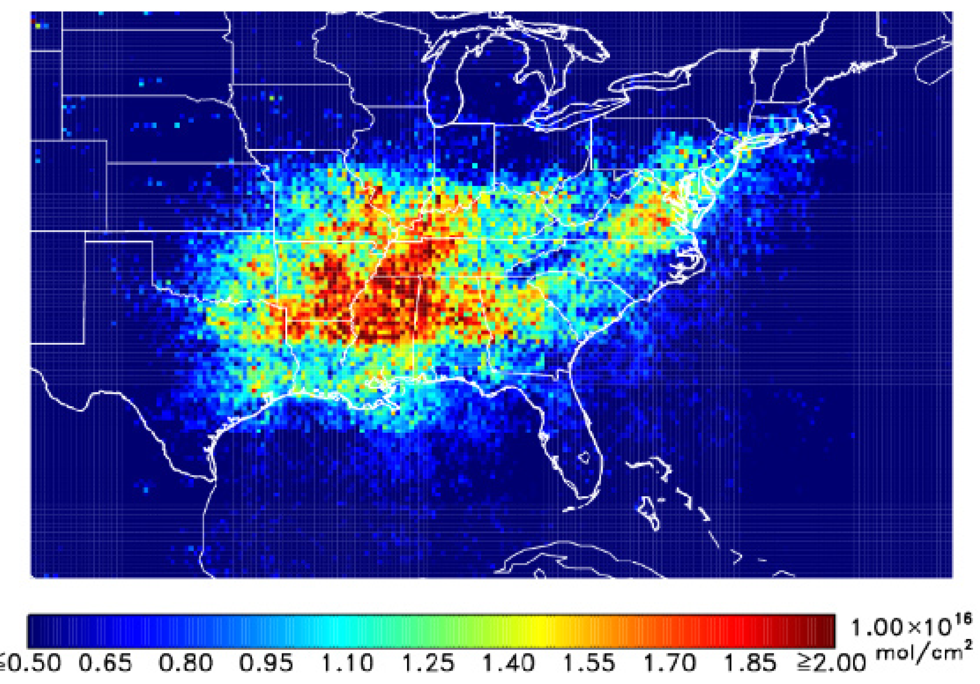


Image provided courtesy of Thomas P. Kurosu and Kelly Chance; Harvard-Smithsonian Center for Astrophysics

Formaldehyde (HCHO) – OMI

Formaldehyde results from the chemical degradation of hydrocarbons in the atmosphere and is useful for assessing the overall burden of reactive hydrocarbons. Averaged OMI observations of formaldehyde over the eastern United States for August 2005 demonstrate the dominant influence of naturally occurring hydrocarbons (e.g., isoprene) emitted from vegetation. These hydrocarbons in combination with metropolitan NO2 sources participate in chemical cycles that often lead to hazardous levels of ozone.

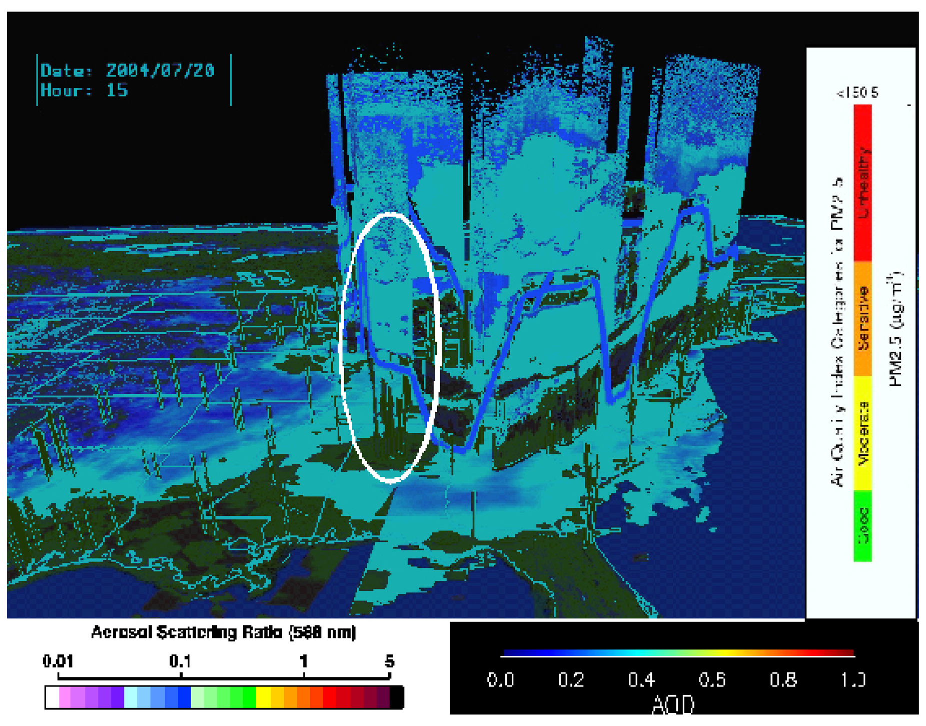


Image provided courtesy of R. Bradley Pierce; NASA Langley Research Center

Airborne Particles (aerosols, smoke, soot, and dust) - MODIS

Airborne particles from natural and human combustion processes influence air quality in ways that can include adverse impacts on health, visibility, and weather. Here, observations of aerosol optical depth (AOD) from MODIS over the southeastern United States are combined with EPA surface station measurements (bars) and NASA DC-8 LIDAR aerosol scattering measurements (curtain) on July 20 to better understand the distribution of aerosols and the impact from various sources.

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